MATHEMATICS

Mathematics Chart

LENGTH

Metric	Customary
1 kilometer = 1000 meters	1 mile = 1760 yards
1 meter = 100 centimeters	1 mile = 5280 feet
1 centimeter = 10 millimeters	1 yard = 3 feet
	1 foot = 12 inches

CAPACITY AND VOLUME

Metric	Customary
1 liter = 1000 milliliters	1 gallon = 4 quarts
	1 gallon = 128 ounces
	1 quart = 2 pints
	1 pint = 2 cups
	1 cup = 8 ounces

MASS AND WEIGHT

Metric	Customary
1 kilogram = 1000 grams	1 ton = 2000 pounds
1 gram = 1000 milligrams	1 pound = 16 ounces

TIME

1 year = 365 days

1 year = 12 months

1 year = 52 weeks

1 week = 7 days

1 day = 24 hours

1 hour = 60 minutes

1 minute = 60 seconds

Metric and customary rulers can be found on the separate Mathematics Chart.

Mathematics Chart

Perimeter	rectangle	$P = 2l + 2w$ or $P = 2(l + w)$
Circumference	circle	$C = 2\pi r$ or $C = \pi d$
Area	rectangle	$A = lw$ or $A = bh$
	triangle	$A = \dfrac{1}{2}\,bh$ or $A = \dfrac{bh}{2}$
	trapezoid	$A = \dfrac{1}{2}\,(b_1 + b_2)h$ or $A = \dfrac{(b_1 + b_2)h}{2}$
	circle	$A = \pi r^2$
Surface Area	cube	$S = 6s^2$
	cylinder (lateral)	$S = 2\pi rh$
	cylinder (total)	$S = 2\pi rh + 2\pi r^2$ or $S = 2\pi r(h + r)$
	cone (lateral)	$S = \pi rl$
	cone (total)	$S = \pi rl + \pi r^2$ or $S = \pi r(l + r)$
	sphere	$S = 4\pi r^2$
Volume	prism or cylinder	$V = Bh*$
	pyramid or cone	$V = \dfrac{1}{3}\,Bh*$
	sphere	$V = \dfrac{4}{3}\,\pi r^3$

B represents the area of the Base of a solid figure.

Pi	π	$\pi \approx 3.14$ or $\pi \approx \dfrac{22}{7}$
Pythagorean Theorem		$a^2 + b^2 = c^2$
Distance Formula		$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
Slope of a Line		$m = \dfrac{y_2 - y_1}{x_2 - x_1}$
Midpoint Formula		$M = \left(\dfrac{x_1 + x_2}{2},\ \dfrac{y_1 + y_2}{2} \right)$
Quadratic Formula		$x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
Slope-Intercept Form of an Equation		$y = mx + b$
Point-Slope Form of an Equation		$y - y_1 = m(x - x_1)$
Standard Form of an Equation		$Ax + By = C$
Simple Interest Formula		$I = prt$

Continued from the previous page

DIRECTIONS

Read each question. Then fill in the correct answer on your answer document. If a correct answer is <u>not</u> <u>here</u>, mark the letter for "Not Here."

SAMPLE A

Find the slope of the line $2y = 8x - 3$.

A $-\dfrac{3}{2}$

B   4

C   8

D   Not Here

SAMPLE B

Janice uses a rectangular box to store her art supplies. The dimensions of the rectangular box are 22.5 inches by 14 inches by 11.5 inches. What is the volume of this box in cubic inches?
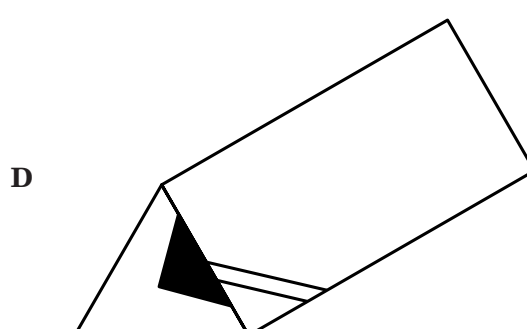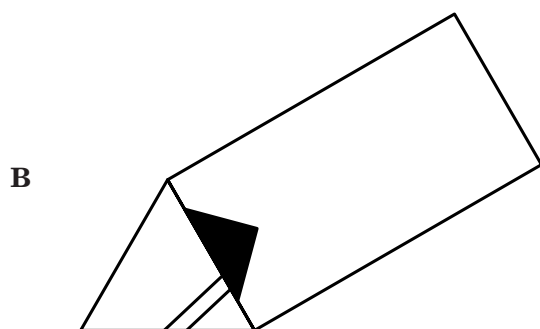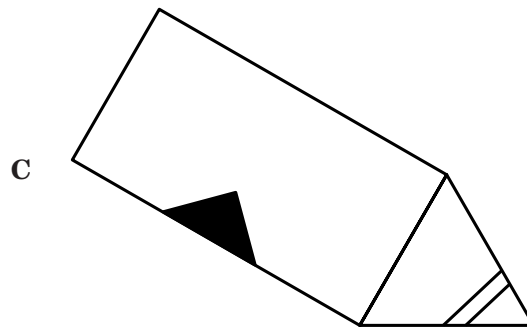
Record your answer and fill in the bubbles on your answer document. Be sure to use the correct place value.

STOP
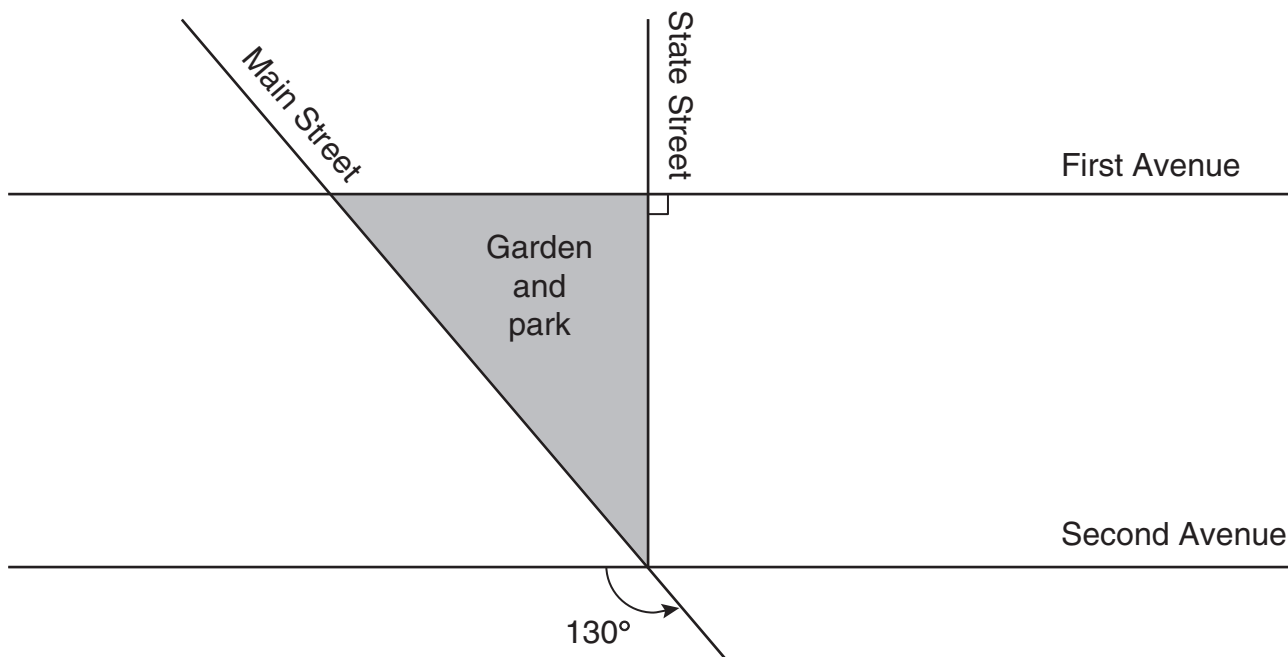
1 The net below shows the surface of a 3-dimensional figure.
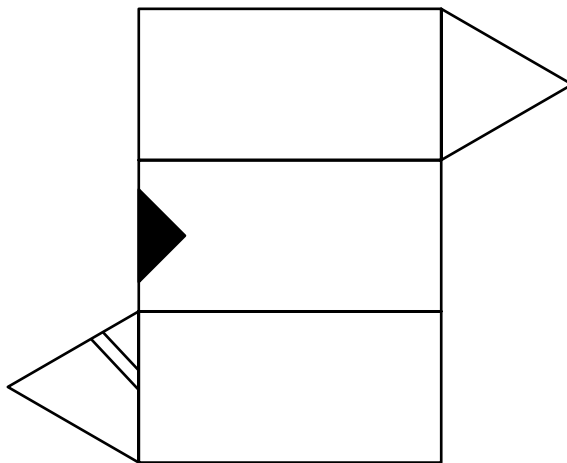
Which 3-dimensional figure does this net represent?

A

C

B

D
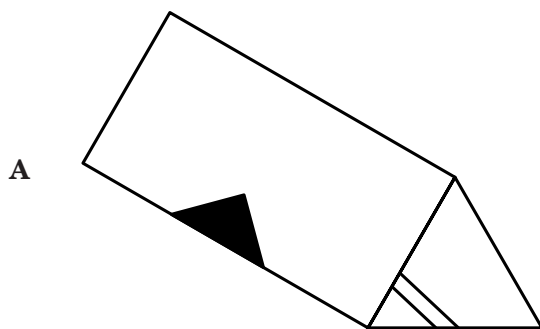
2 On the map below, First Avenue and Second Avenue are parallel. A city planner proposes to locate a small garden and park on the triangular island formed by the intersections of four streets shown below.

What are the measures of the three angles of the garden?

F 90°, 65°, 25°

G 90°, 50°, 40°

H 90°, 60°, 30°

J 130°, 40°, 10°

3 At a restaurant the cost for a breakfast taco and a small glass of milk is $2.10. The cost for 2 tacos and 3 small glasses of milk is $5.15. Which pair of equations can be used to determine t, the cost of a taco, and m, the cost of a small glass of milk?

A $t + m = 2.10$

   $2t + 2m = 5.15$

B $t + m = 2.10$

   $3t + 3m = 5.15$

C $t + m = 2.10$

   $3t + 2m = 5.15$

D $t + m = 2.10$

   $2t + 3m = 5.15$

4 What is the effect on the graph of the equation $y = x^2 + 1$ when it is changed to $y = x^2 + 5$?

F The slope of the graph changes.

G The curve translates in the positive x direction.

H The graph is congruent, and the vertex of the graph moves up the y-axis.

J The graph narrows.

5 The manager of a sandwich shop is planning to make a circle graph showing the types of sandwiches sold in one day. The table below summarizes these data.
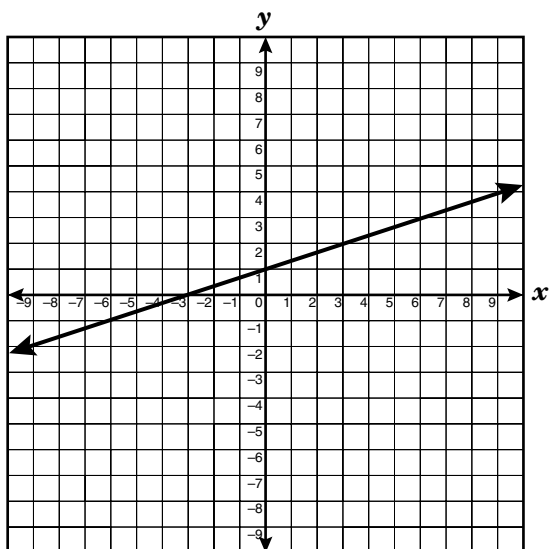
Sandwiches Sold in One Day

Roast beef	195
Turkey-and-cheese	125
Ham-and-cheese	75
Vegetable	50
Other	55

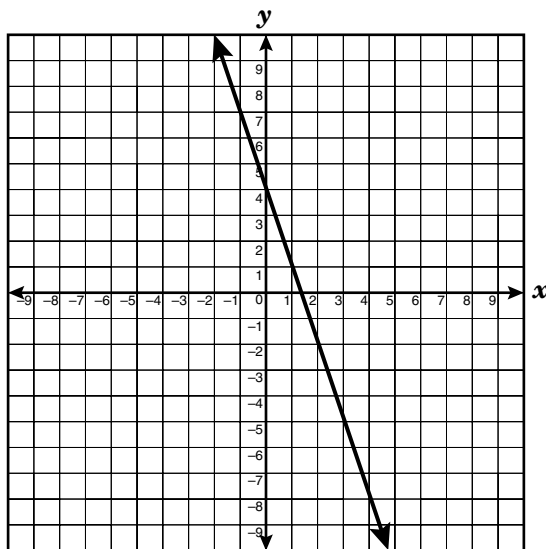What central angle should the manager use for the section representing the ham-and-cheese sandwich?

A 270°

B 75°

C 54°

D 15°

6 Which graph best represents a line parallel to the line with the equation $y = 3x + 4$?

F

H

G

J

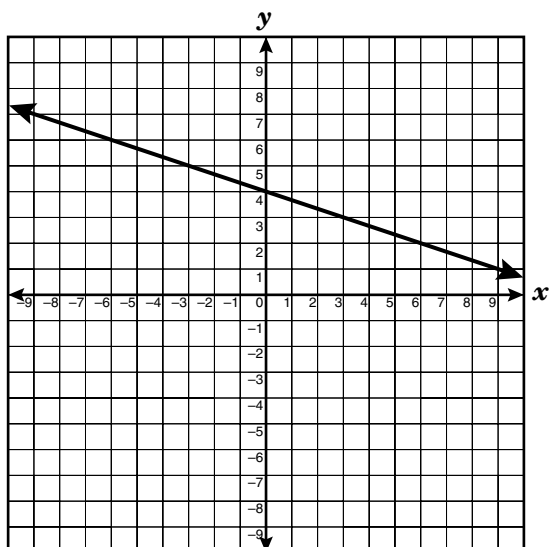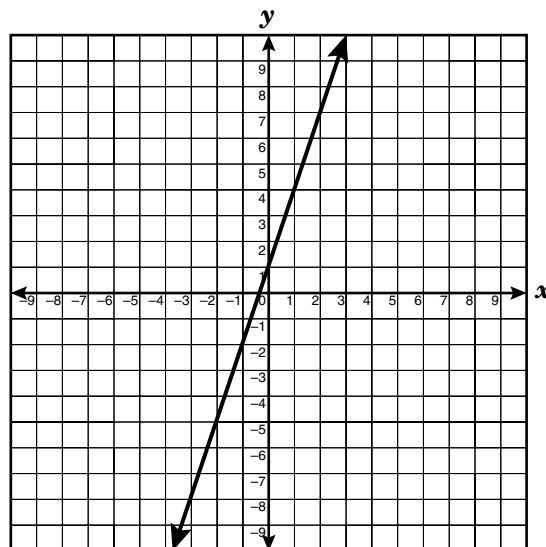**7** On Friday Daniel wrote a check for $158. The following Monday he deposited $60 into his bank account. On Wednesday the bank informed him that he had overdrawn his account by $8. If Daniel made no other transactions between Friday and Wednesday, what was his balance before he wrote the check on Friday?

   A $90

   B $98

   C $106

   D $210

8 An automobile dealer is analyzing a frequency table identifying the number of vehicles of each color sold during the last 6 months. Which measure of data describes the most popular color of vehicle sold?

   F Mean

   G Median

   H Mode

   J Range

9 Use the ruler on the Mathematics Chart to measure the dimensions of the composite figure to the nearest tenth of a centimeter.

Which best represents the approximate area of this composite figure?

A 34.7 cm^2

B 38.8 cm^2

C 44.6 cm^2

D 54.5 cm^2

10 Galván's Grocery Store sells 3 cans of soup for a total of $0.85. The total cost, c, of purchasing n cans of the soup can be found by —

F multiplying n by c

G multiplying n by the cost of 1 can

H dividing n by c

J dividing c by the cost of 1 can

11 Eddie's Towing Company charges $40 to hook a vehicle to the tow truck and $1.70 for each mile the vehicle is towed. Which equation best represents the relationship between the number of miles towed, m, and the total charges, c?

A $c = 40 + 1.70$

B $c = 40 + 1.70m$

C $c = 40m + 1.70m$

D $c = 40m + 1.70$

GO ON

12 Allison has a cylindrical candle mold with the dimensions shown below.
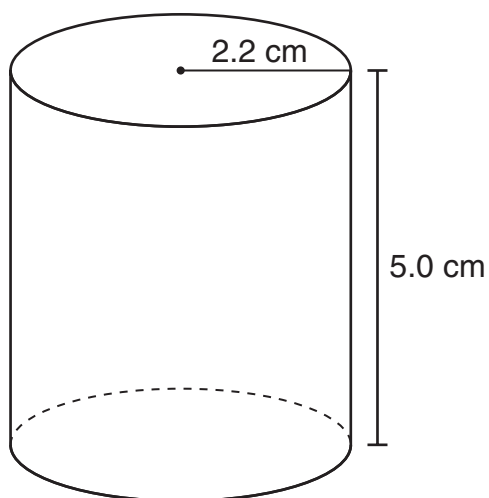
If Allison has a rectangular block of wax that measures 12 centimeters by 10 centimeters by 20 centimeters, about how many candles can she make after melting the block of wax?

F 31

G 35

H 69

J 76

13 Use the information in each diagram to find the pair of similar polygons.

A

63°

80°

27°

80°

C

4

2

6

4

B

36°

72°

D

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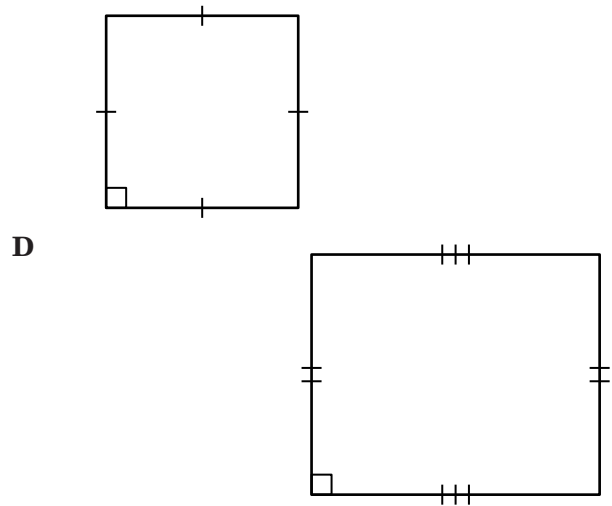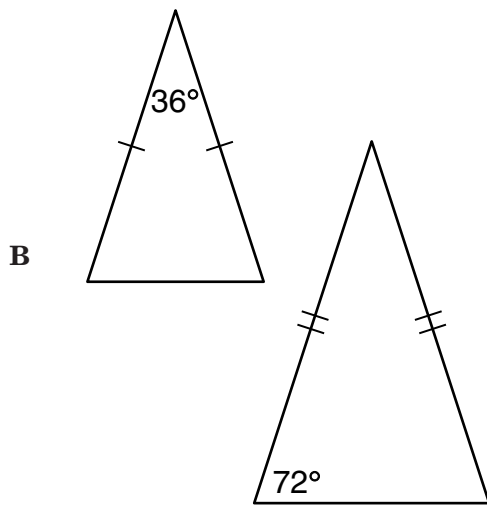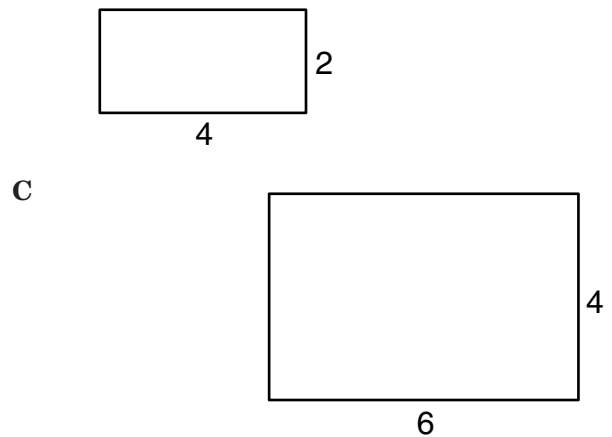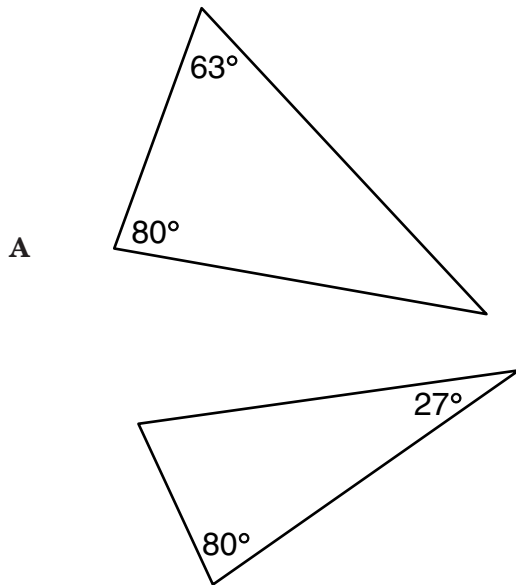
14 How many faces, edges, and vertices does a square pyramid have?

    F   4 faces, 6 edges, and 4 vertices

    G   5 faces, 6 edges, and 6 vertices

    H   5 faces, 8 edges, and 5 vertices

    J   6 faces, 12 edges, and 8 vertices

15 What are the x-intercepts of the graph of the equation $y = x^2 + x - 12$?

    A $x = 4$, $x = 3$

    B $x = -4$, $x = 3$

    C $x = -4$, $x = -3$

    D $x = 4$, $x = -3$

16 The algebraic form of a linear function is $d = \frac{1}{4}l$, where d is the distance in miles and l is the number of laps. Which of the following choices identifies the same linear function?

F For every 4 laps on the track, an athlete runs 1 mile.

G For every lap on the track, an athlete runs $\frac{1}{8}$ mile.

H

l	d
0	0
2	$\frac{1}{2}$
4	$\frac{1}{4}$

J

l	d
$\frac{1}{4}$	1
1	4
4	16

17 As a waiter in a restaurant, Steven works 6-hour shifts. He earns $5 per hour and keeps 80% of his tip money. How much tip money does he need to receive per shift to earn a total of exactly $50 before taxes are deducted?

A $16

B $20

C $25

D $40

18 Olivero is choosing between two brands of AAA batteries for his graphing calculator. A package of three Brand M batteries costs $5.50, and a package of three Brand P batteries costs $3.85. What percent of the cost of Brand M batteries did Olivero save by buying a package of Brand P batteries?

F 17%

G 30%

H 43%

J 70%

19 A coordinate grid is placed over a map. City A is located at $(-3, 2)$, and City B is located at $(4, 8)$. If City C is at the midpoint between City A and City B, which is closest to the distance in coordinate units from City A to City C?
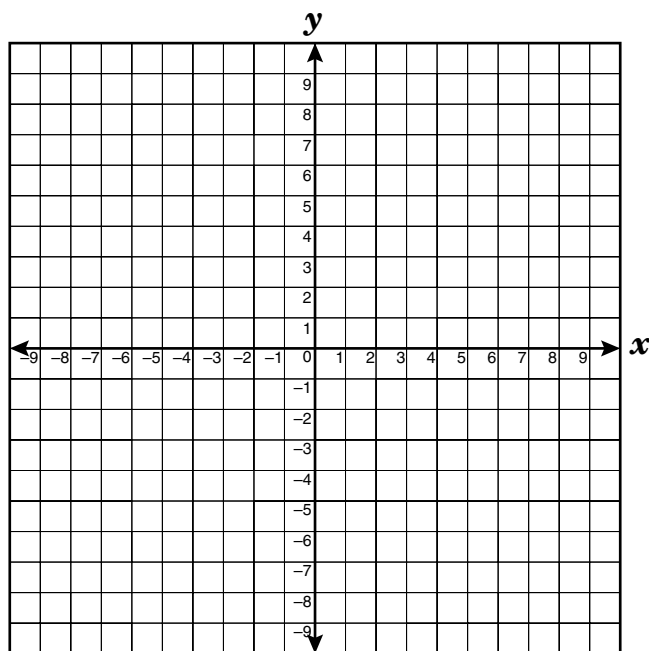
A 4.61 units

B 6.52 units

C 9.22 units

D 21.25 units

20 A fence around a square garden has a perimeter of 48 feet. Find the approximate length of the diagonal of this square garden.

    F   12 ft

    G 17 ft

    H 21 ft

    J   24 ft

21 Solve the equation $2a - 6 + 5a = 3a + 10$ for a.

Record your answer and fill in the bubbles on your answer document. Be sure to use the correct place value.

22 Which of these equations describes a relationship in which every real number x corresponds to a nonnegative real number?

F $y = x$

G $y = x^2$

H $y = x^3$

J $y = -x$

23 Valerie purchased x tubes of lipstick at \$4 each and y bottles of nail polish at \$2 each. She spent less than \$12, not including tax. Use the grid below to graph the inequality $4x + 2y < 12$.
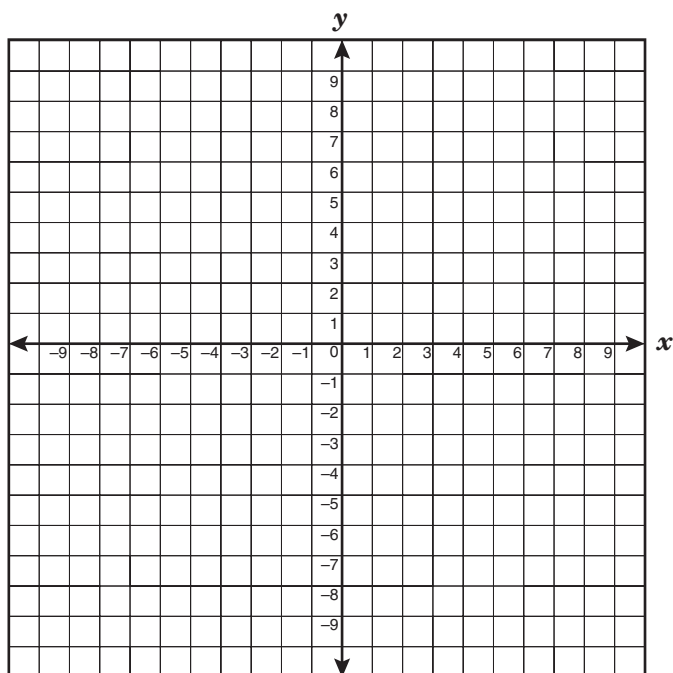
Which point represents a reasonable number of lipsticks and bottles of nail polish that Valerie purchased?

A $(1, 5)$

B $(2, 3)$

C $(1, 3)$

D $(2, 2)$

24 If $\angle A$ and $\angle B$ are complementary angles and $m\angle A$ is x, which equation can be used to find y, $m\angle B$?

F $y = 90 + x$

G $y = 90 - x$

H $y = 180 - x$

J $y = x + 180$

25 Which expression is equivalent to $(5n - 2)3n - (5n - 2)(n - 1)$?

A $n - 1$

B $3n^2 - 3n$

C $10n^2 - 13n + 2$

D $10n^2 + n - 2$

26 The student council at Monroe High School is planning a schoolwide trip. A local roller-skating rink will provide a discounted rate if at least 250 of the school's 2340 students sign up for the trip. The student council surveyed a random sample of students and asked which of the following activities the students would prefer as a school trip.

Survey Results

Activity	Students
Skating	20
Bowling	30
Watching a movie	110
Swimming	40

Based on the data in the survey, how many students are likely to choose skating?

F 234

G 260

H 351

J 468

27 Figure *MNPQ* is shown on the coordinate plane.
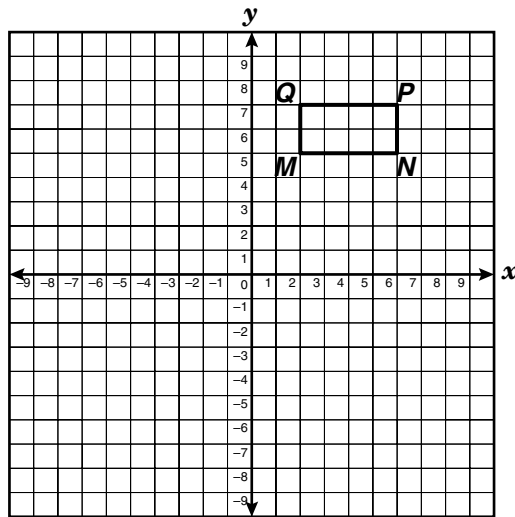
Which transformation creates an image with a vertex at the origin?

A Rotate figure *MNPQ* 90° around *M*

B Reflect figure *MNPQ* across the line $x = 1$

C Reflect figure *MNPQ* across the line $y = 2.5$

D Translate figure *MNPQ* to the left 6 and down 5

28 An equation can be used to find the total cost of buying square-foot floor tiles to cover an area of floor. Using the table below, find the equation that best represents y, the total cost, as a function of x, the number of square feet to be covered.

Number of Square Feet (x)	Total Cost (y)
1800	$630
2300	$805
2900	$1015

F $x = 0.35y$

G $y = 0.35x$

H $x = 2.86y$

J $y = 2.86x$

29 Given the function $y = 3.54x - 54.68$, which statement best describes the effect of increasing the y-intercept by 33.14?

A The new line is parallel to the original.

B The new line has a greater rate of change.

C The x-intercept increases.

D The y-intercept decreases.

30 Mr. Ryan is flying his single-engine plane at an altitude of 2400 feet. He sees a cornfield at an angle of depression of 30°.
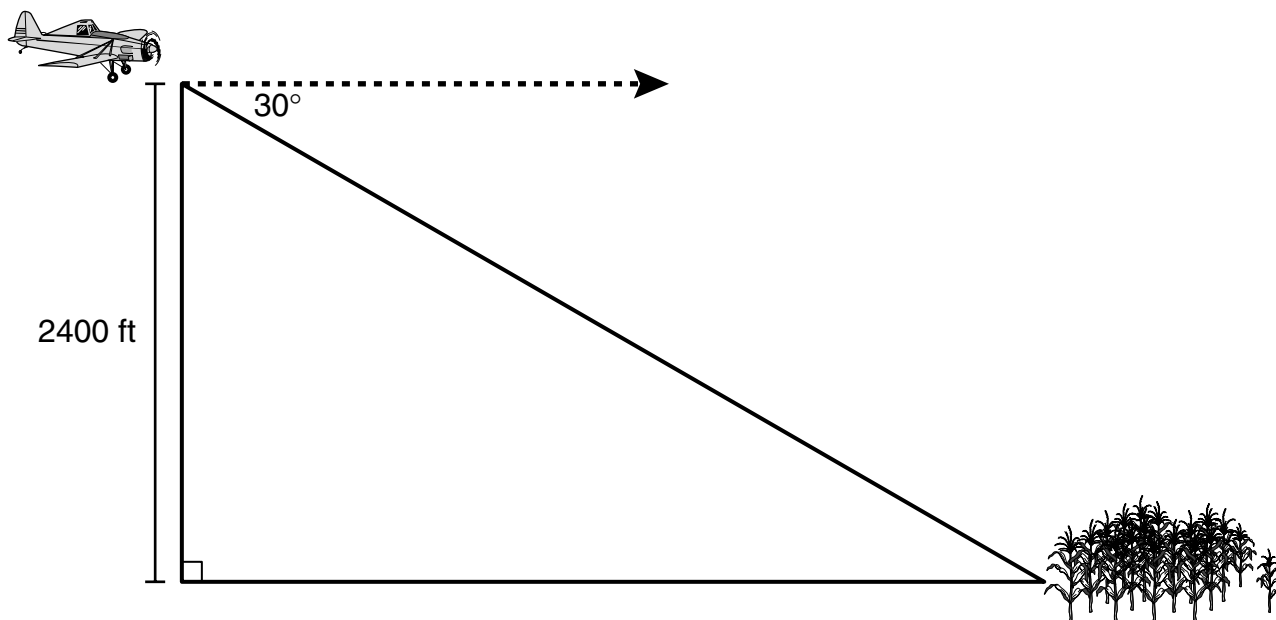
What is Mr. Ryan's approximate horizontal distance from the cornfield at this point?

F   1200 ft

G   3394 ft

H   4157 ft

J   4800 ft

31 Jaime purchased a used car on sale for $3450. The original price of the used car was $4100. Which expression can be used to determine the percent of the original price that Jaime saved on the purchase of this car?

A $\dfrac{3450}{4100} \times 100$

B $\dfrac{4100}{3450} \times 100$

C $\dfrac{(4100 - 3450)}{3450} \times 100$

D $\dfrac{(4100 - 3450)}{4100} \times 100$

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GO ON

32 A triangle with vertices $(1, 2)$, $(5, 2)$, and $(3, -2)$ is shown below.
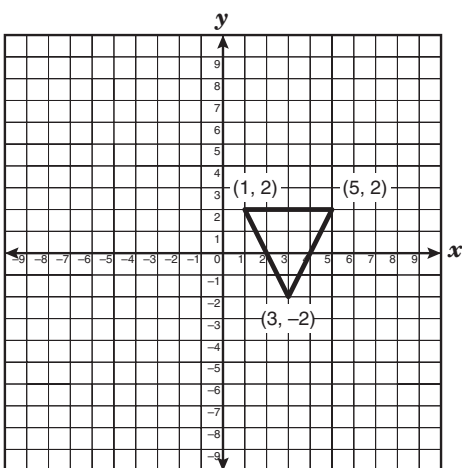
Which triangle below is similar to the figure above?
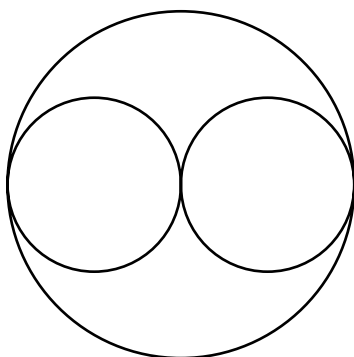
F

H

G

J

GO ON
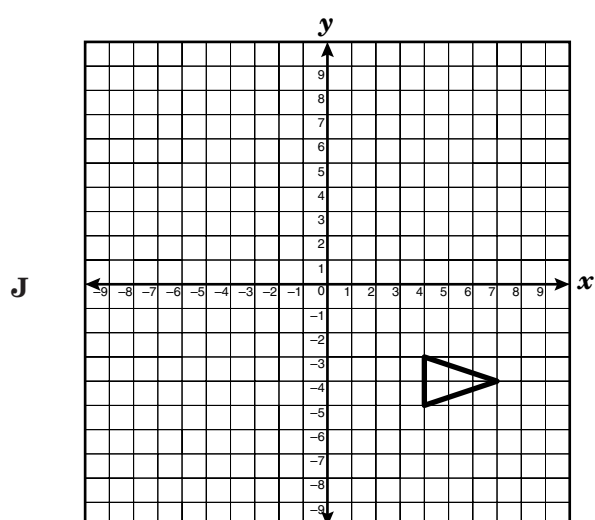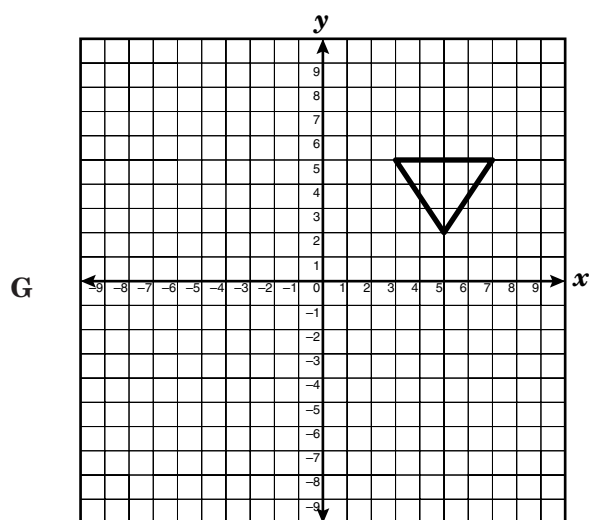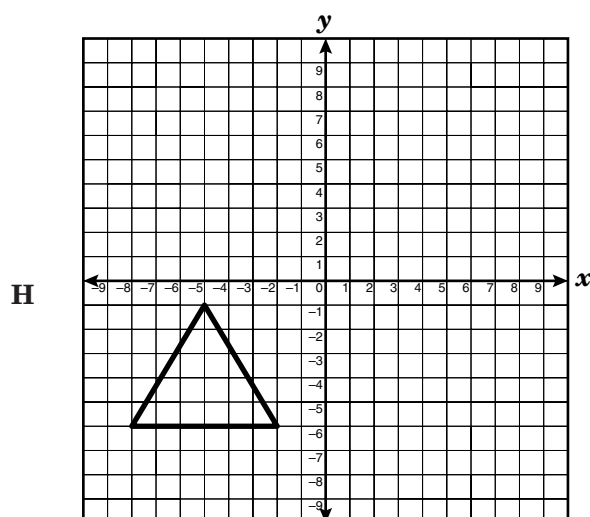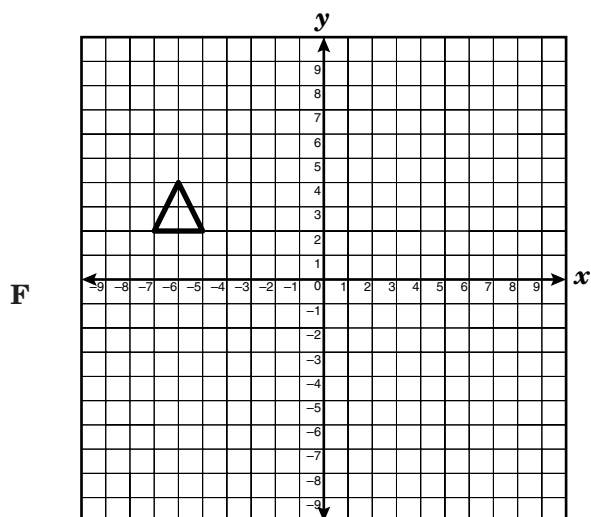
33 A rectangular solid has a volume of 24 cubic decimeters. If the length, width, and height are all changed to $\frac{1}{2}$ their original size, what will be the new volume of the rectangular solid?

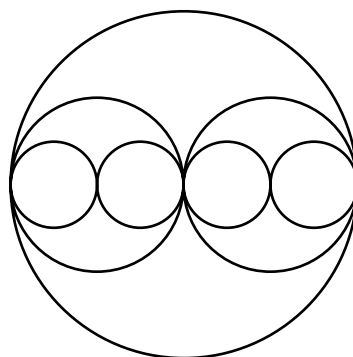**A** 3 dm^3

B 4 dm^3

C 6 dm^3

D 12 dm^3

34 The figure below shows the first 3 stages of a fractal.
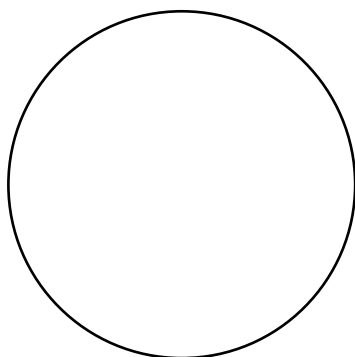
Stage 1   Stage 2   Stage 3

How many circles will the nth stage of this fractal contain?

F $2n$

G 2^n

H $2n - 1$

J $2^n - 1$

35 Anna makes hand-painted plates. Her overhead costs are $750 per week, and she pays an additional $10 per plate in material costs. If Anna sells the plates for $25 each, how many plates does she have to sell each week before she can make a profit?

A   20

B   30

C   50

D   75

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36 Which graph best represents the line passing through the point $(0, 4)$ and perpendicular to $y = -\frac{1}{2}x$?

F

H

G

J
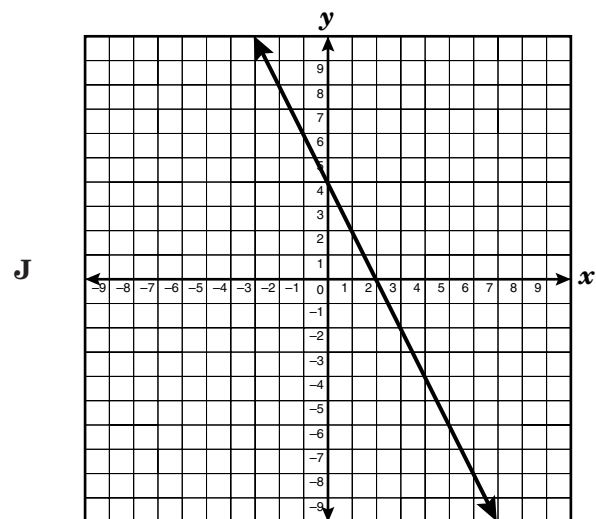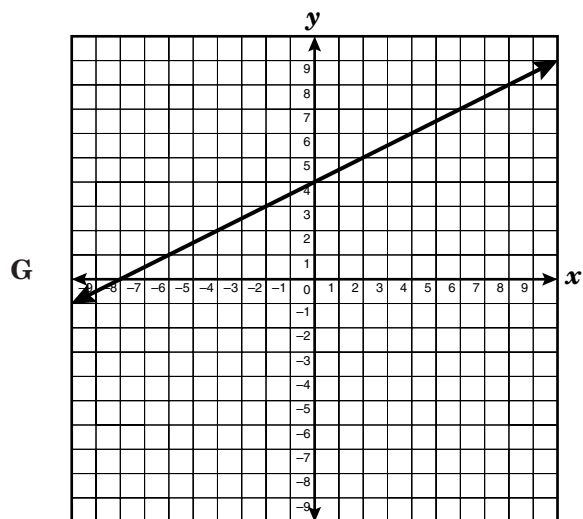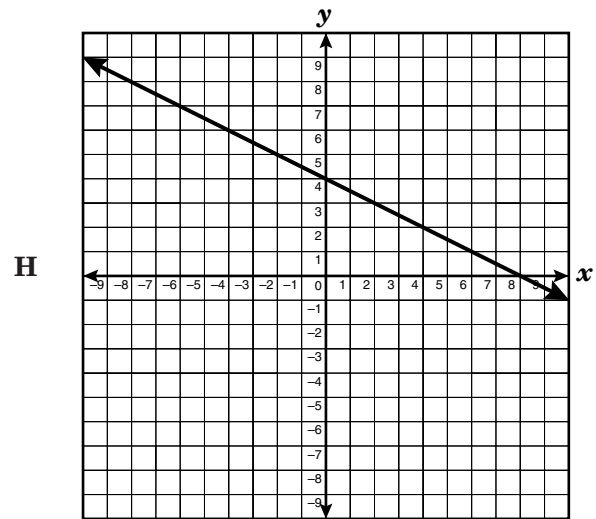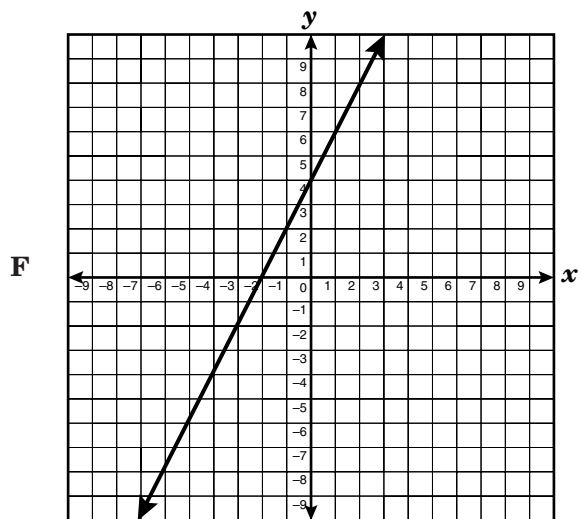
37 At the Dallas-Fort Worth International Airport, a DC-10, at 4500 feet, is descending toward the east runway at a rate of 150 feet per minute, and a 727, at 600 feet, is climbing at a rate of 75 feet per minute. Which graph shows when the two planes will be at the same altitude?

A

C

B

D

GO ON
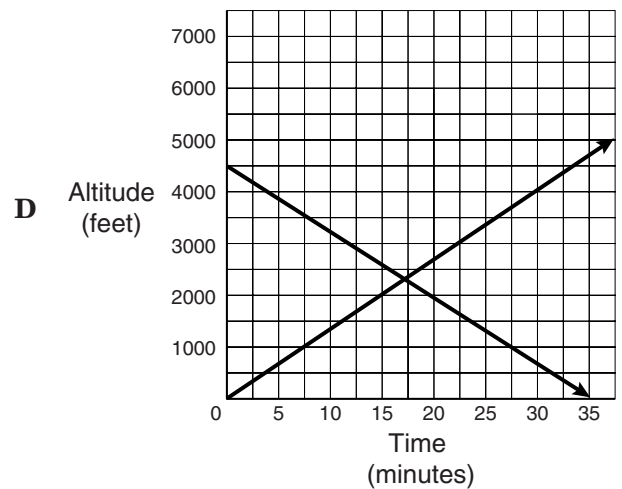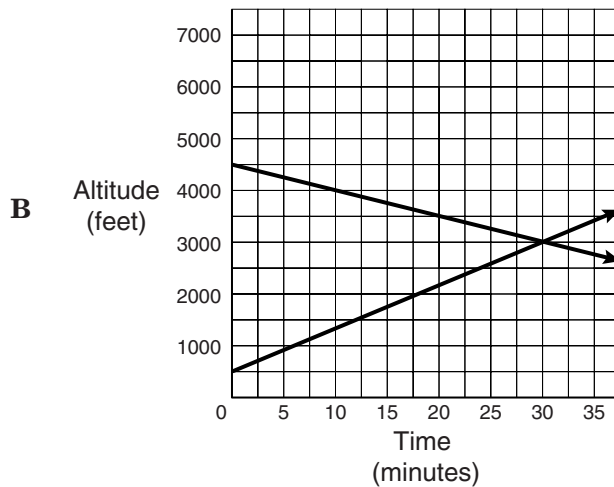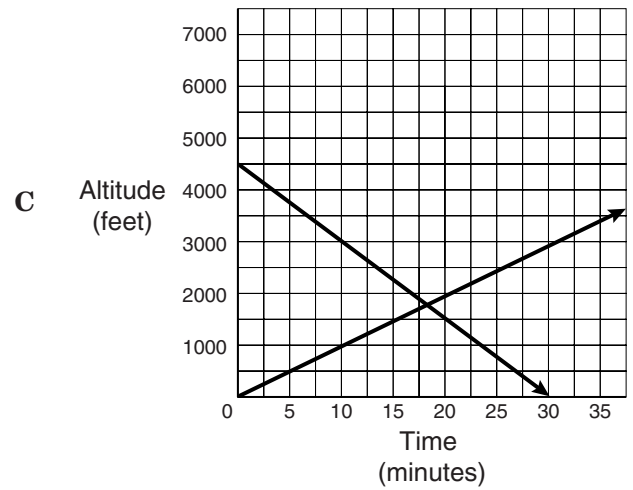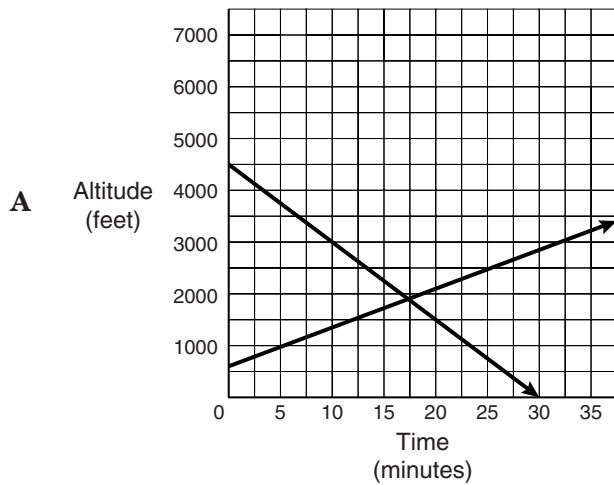
38 In a survey of 80 nutritionists, 8 said they eat tacos. Of the 8 who said they eat tacos, 2 said they eat Brand A tacos. If an advertisement for Brand A tacos states "25% of the nutritionists surveyed eat Brand A tacos," which conclusion is valid based on the information given?

F The ad is accurate because 2 out of 8 nutritionists is 25%.

G The ad is accurate because nutritionists are food experts.

H The ad is inaccurate because only 2.5% of the surveyed nutritionists eat Brand A tacos.

J The ad is inaccurate because the survey should include people who are not nutritionists.

39 In El Paso, Texas, the streets named Hercules Avenue, Hondo Pass Drive, and Trans Mountain Road are parallel. They all intersect Dyer Street and U.S. Route 54, as shown on the map below.
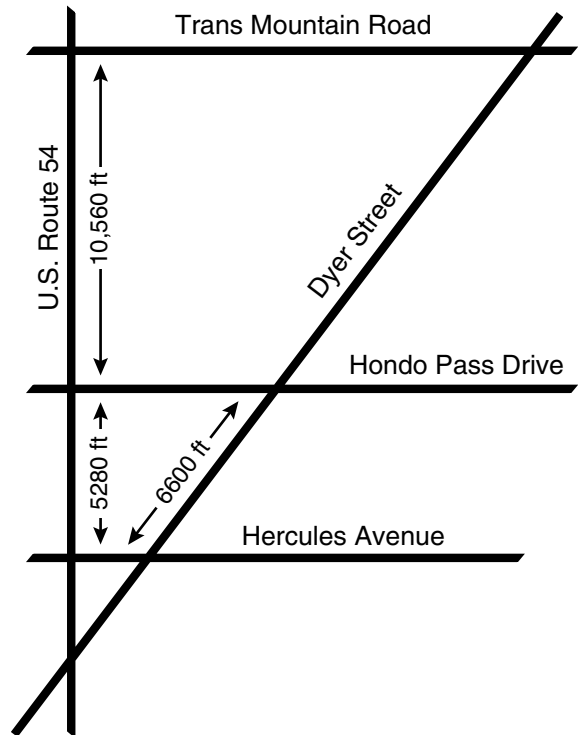
If all of these streets are straight line segments, how long is Dyer Street between Hercules Avenue and Trans Mountain Road?

A 8,450 ft

B 9,900 ft

C 13,200 ft

D 19,800 ft

40 Maria has 4 more movie passes than Toni. Angela has half as many passes as Maria. The three girls have a total of 21 movie passes. Which equation can be used to find how many movie passes Toni has?
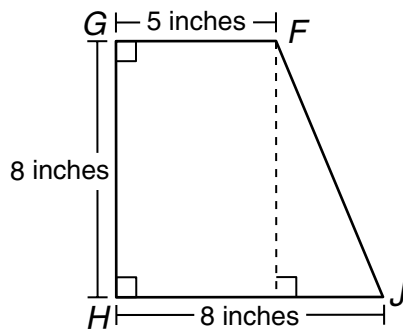
F $x + 4x + \dfrac{1}{2}x = 21$

G $x + (x + 4) + \dfrac{1}{2}x = 21$

H $x + (x + 4) + \dfrac{1}{2}(x + 4) = 21$

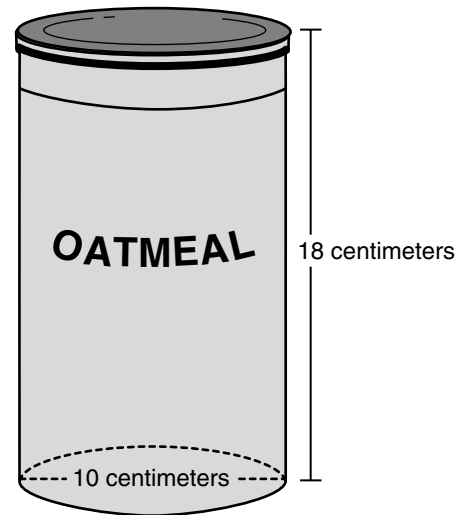**J** $x + 4x + \dfrac{1}{2}(4x) = 21$

41 The total area of trapezoid *FGHJ* is 52 square inches.

What is the approximate length of $\overline{FJ}$?

A 8.0 in.
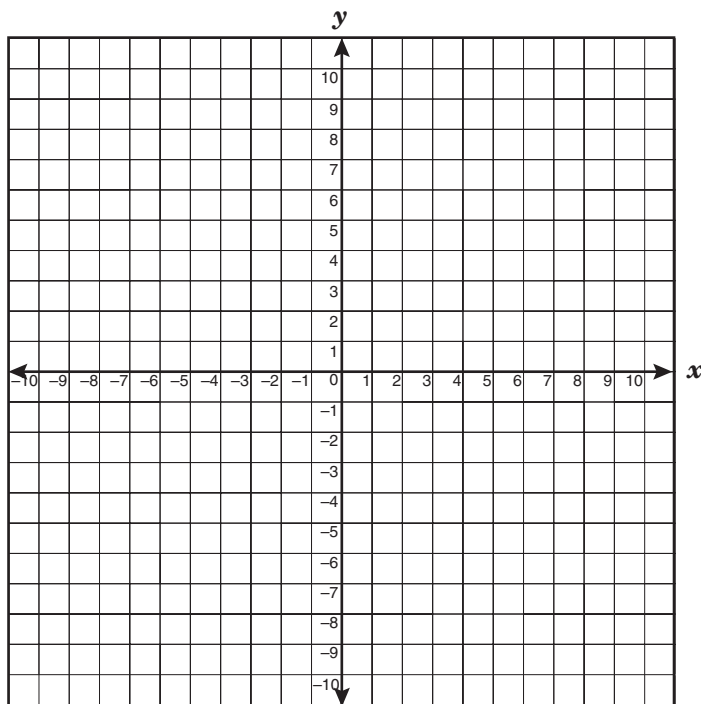
B 8.5 in.

C 11.0 in.

D 11.5 in.

42 Oatmeal is packaged in a cylindrical container with the dimensions shown in the drawing.

Find the approximate volume of this oatmeal container.
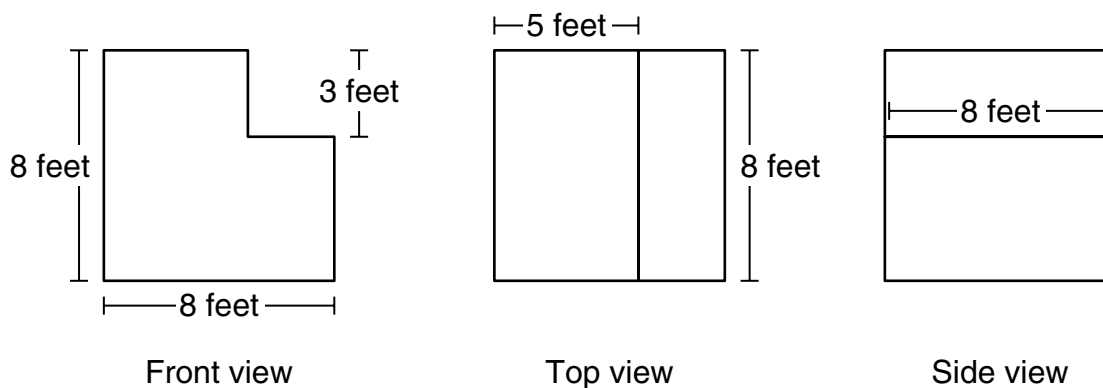
F 471 cm^3

G 566 cm^3

H 1413 cm^3

J 5655 cm^3

43 What are the slope and y-intercept of a line that contains the point $(5, -1)$ and has the same y-intercept as $x - 3y = 6$?

A $m = \dfrac{1}{3}$

   $b = 6$

B $m = 5$

   $b = -2$

C $m = \dfrac{1}{5}$

   $b = -2$

D $m = 3$

   $b = 6$

44 What is the volume of a 3-dimensional object with the dimensions shown in the 3 views below?

Front view   Top view   Side view

F 120 cu ft

G 440 cu ft

H 512 cu ft

J 960 cu ft

---

45 The table shows the number of slices of pepperoni placed on each size of pizza at Pepe's Pizza Shop.

Size of Pizza	Radius of Pizza (inches)	Number of Pepperoni Slices
Single	2	5
Small	4	17
Medium	5	26
Large	8	65
Extra large	10	101

Let r represent the radius of the pizza and let n represent the number of slices of pepperoni. Identify the equation that best represents the relationship between the radius and the number of slices of pepperoni.

A $r = 2n + 1$

B $n = 2r + 1$

C $r = n^2 + 1$

D $n = r^2 + 1$

46 At a firefighters' pancake breakfast, the firefighters served 345 people and raised $1395. If the cost of a, an adult's ticket to the pancake breakfast, was $5 and the cost of c, a child's ticket, was $3, what was the number of adult tickets sold?

    F   165

    G   180

    H   279

    J   345

47 What is the solution set for the equation $4(3x - 2)^2 = 36$?

    A $\{-\frac{11}{6}, \frac{11}{6}\}$

    B $\{-\frac{11}{3}, \frac{11}{3}\}$

    C $\{-\frac{1}{3}, \frac{5}{3}\}$

    D $\{-\frac{2}{3}, \frac{4}{3}\}$

48 Which expression best represents the simplification of $(3m^{-2}n^4)(-4m^6n^{-7})$?

    F $-\dfrac{12m^4}{n^3}$

    G $-\dfrac{1}{12m^4n^3}$

    H $-\dfrac{m^4n^3}{12}$

    J $-\dfrac{12n^3}{m^4}$

49 Which shows the functions correctly listed in order from widest to narrowest graph?
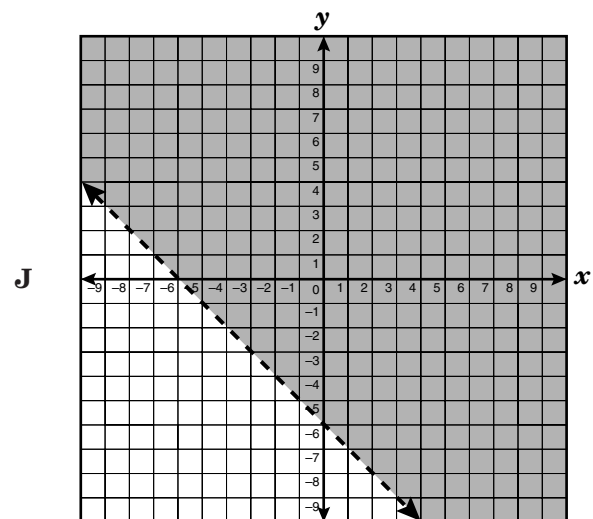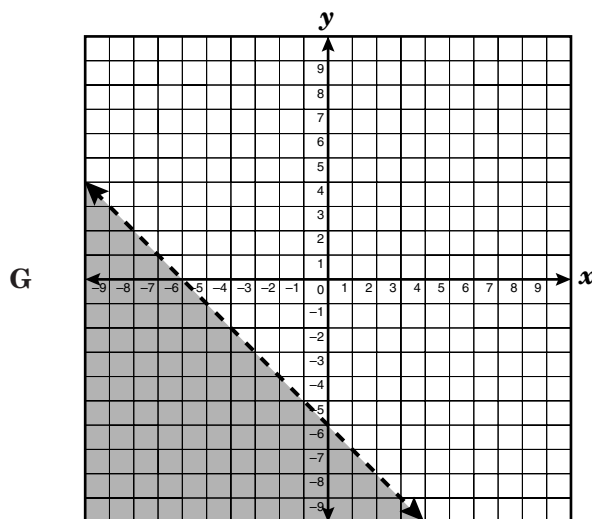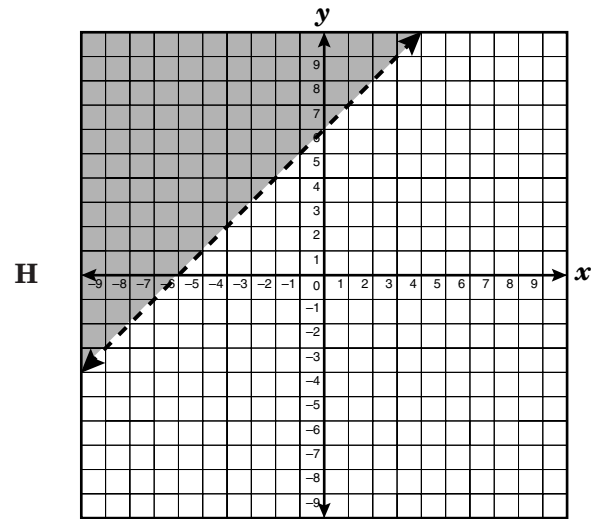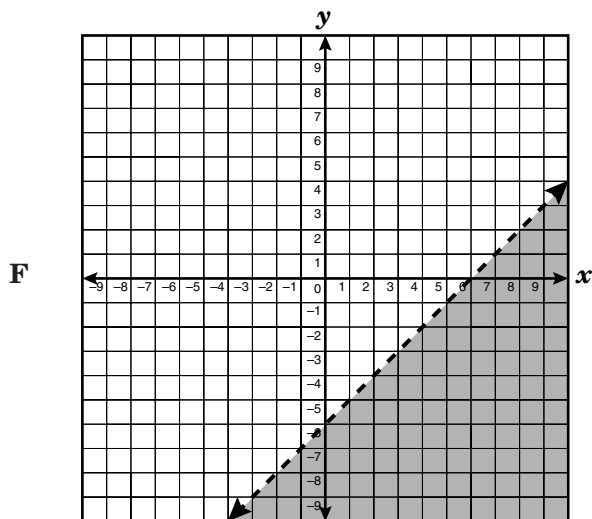
A $y = -7x^2, \quad y = -\dfrac{1}{7}x^2, \quad y = \dfrac{3}{4}x^2, \quad y = 5x^2$

B $y = -\dfrac{1}{7}x^2, \quad y = \dfrac{3}{4}x^2, \quad y = 5x^2, \quad y = -7x^2$

C $y = \dfrac{3}{4}x^2, \quad y = -\dfrac{1}{7}x^2, \quad y = 5x^2, \quad y = -7x^2$

D $y = -7x^2, \quad y = 5x^2, \quad y = -\dfrac{1}{7}x^2, \quad y = \dfrac{3}{4}x^2$

---

50 Which graph best represents all the pairs of numbers (x, y) such that $x + y < -6$?

F

H

G

J

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GO ON

51 Find the equation that can be used to determine the total area of the composite figure shown below.
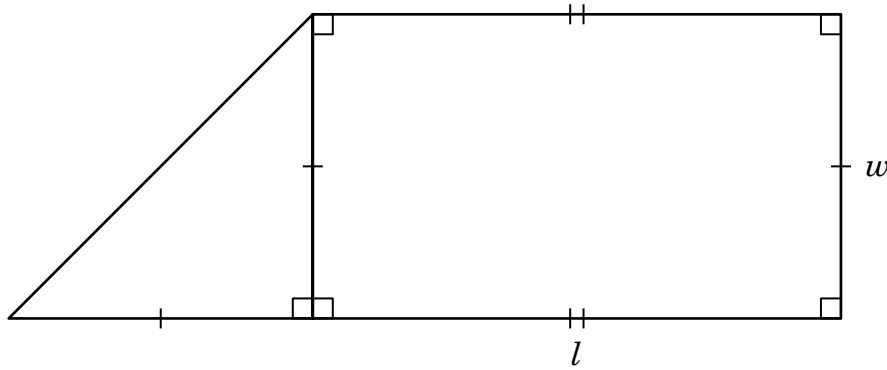

A $A = lw + \dfrac{1}{2}w^2$

B $A = lw + w^2$

C $A = w + 2l + w^2$

D $A = w + 2l + \dfrac{1}{2}w^2$

52 Lisa has a circular piece of cardboard with a 10-inch diameter. She wants to cut a 10-inch-by-2-inch rectangle from the circle. She also wants to cut 10 square pieces that are 1 inch on each side. Which information makes this scenario impossible?

F There will be no cardboard left after the rectangle has been cut.

G A 10-inch-long rectangle cannot be cut from the circular cardboard.

H Squares cannot be cut from the circle.

J There will not be enough cardboard to cut all the 1-inch-square pieces indicated.

53 What is the *y*-intercept of the function graphed below?
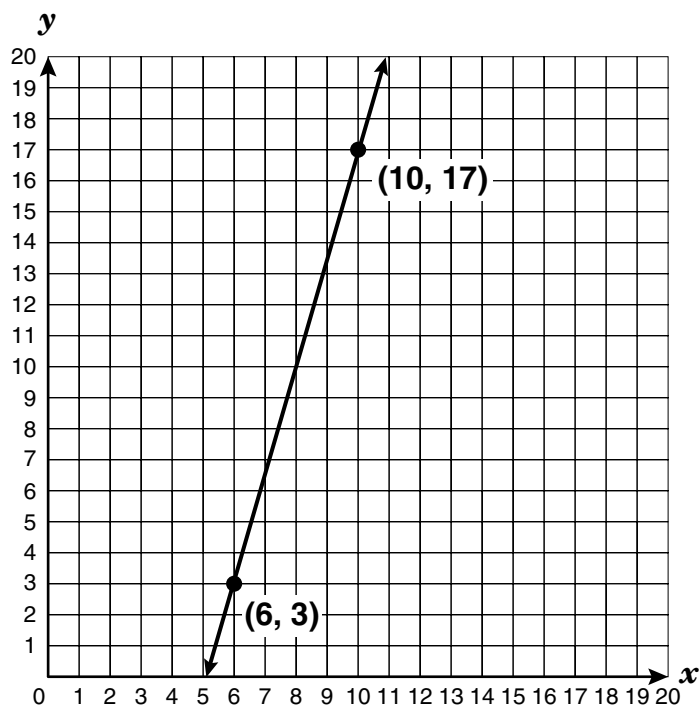
A -24

B -21

C -18

D -9

54 The figures below show a pattern of dark tiles and white tiles that can be described by a relationship between 2 variables.
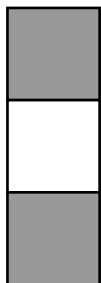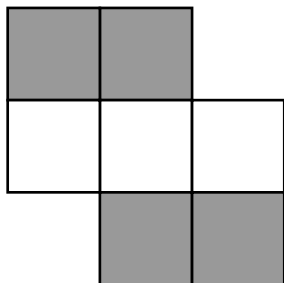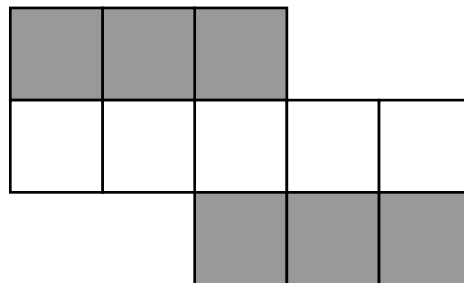

Figure 1   Figure 2   Figure 3

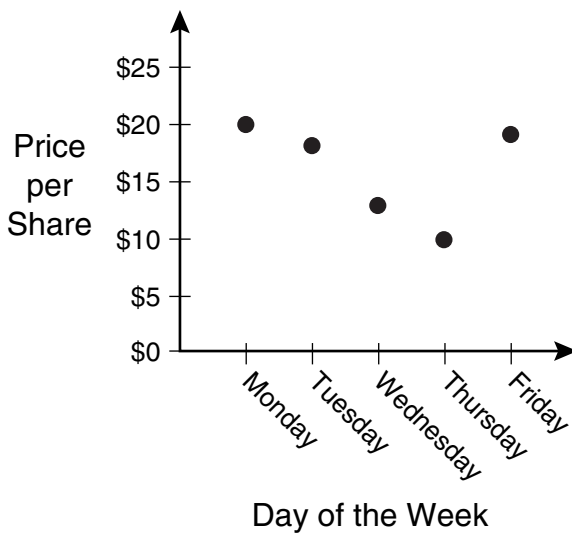Which rule relates d, the number of dark tiles, to w, the number of white tiles?

F $d = 2w$

G $w = d - 1$

H $d = 2w - 2$

J $w = \frac{1}{2}d + 1$

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55 The graph shows the price of a share of Compuco stock at the close of each day during a 1-week period.

Day of the Week

Based on the data in the graph, which conclusion is most accurate?

A The closing price remained constant throughout the week.

B The closing price increased at the beginning of the week and then leveled off at the end of the week.

C The closing price decreased at the beginning of the week and then increased at the end of the week.

**D** The closing price each day was lower than the closing price on the previous day.

56 On Wednesdays an athlete's schedule allows no more than 75 minutes for morning training. One round of a strength routine, s, requires 8 minutes. One round of an endurance routine, e, requires 12 minutes. Which of these best represents the time available for the athlete to spend on strength and endurance routines on Wednesdays?

F $20(s + e) > 75$

G $8s = 75 - 12e$

H $8s + 12e \leq 75$

J $12e < 75 + 8s$

**57** What is the slope of the line identified by $2y = -3(x - 2)$?

A -3

B $-\dfrac{3}{2}$

C $\dfrac{2}{3}$

D 2

GO ON

58 Which of the following is the correct name for figure *ABCD*, with vertices *A* (4, 6), *B* (8, 7), *C* (7, 3), and *D* (3, 2)?
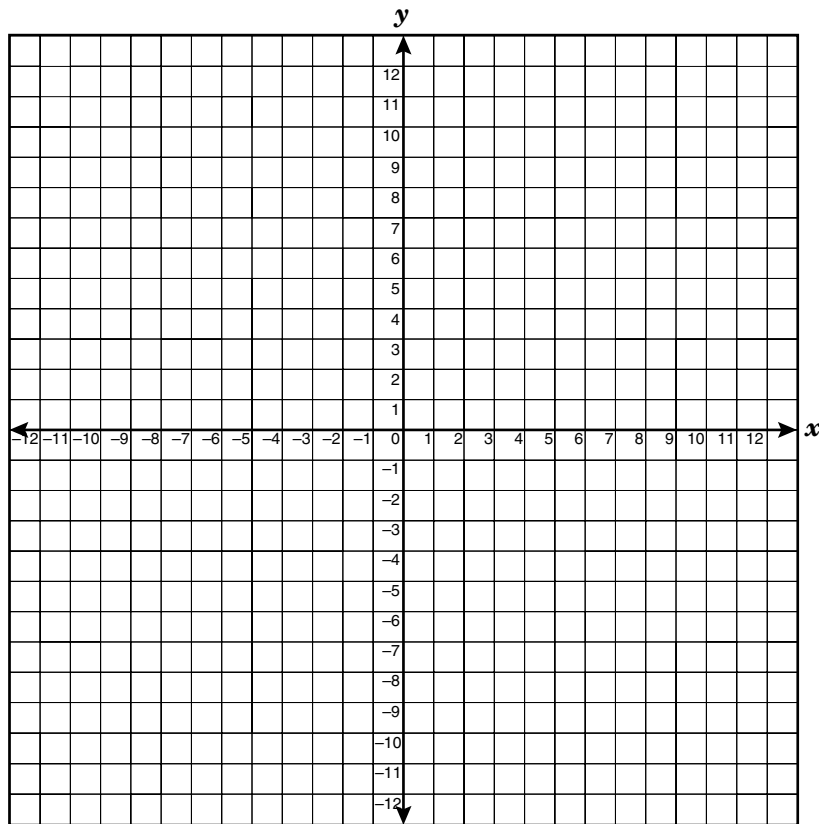
F Rectangle

G Rhombus

H Trapezoid

J Square

59 Gina did a research project on how age affects sleep patterns. She concluded that as people age, they sleep fewer hours until a point in adulthood when the number of hours remains constant. Gina also found that after the age of 70 the amount of time spent sleeping increases slightly. Which graph best shows the results of Gina's research?

A   Amount of Sleep / Age

C   Amount of Sleep / Age

B   Amount of Sleep / Age

D   Amount of Sleep / Age
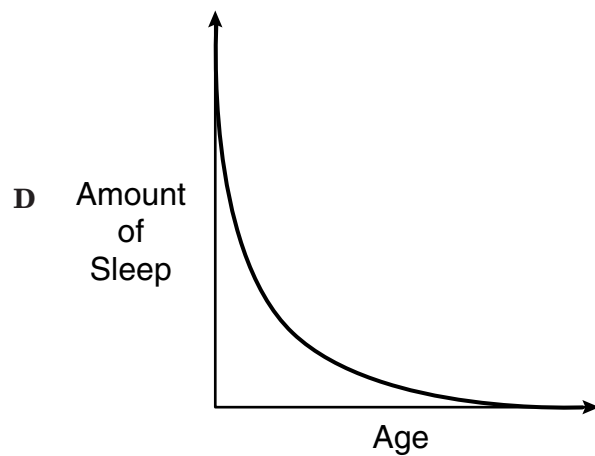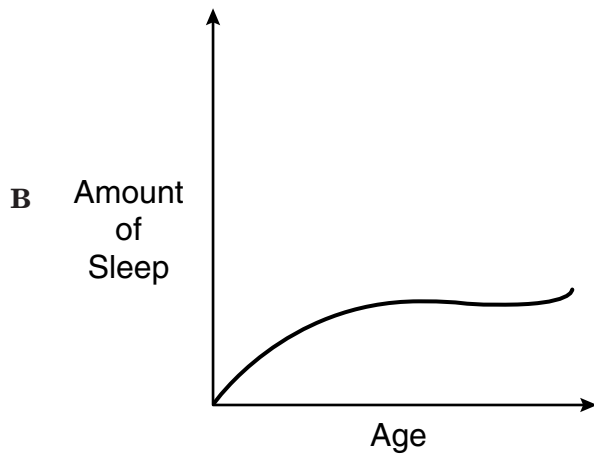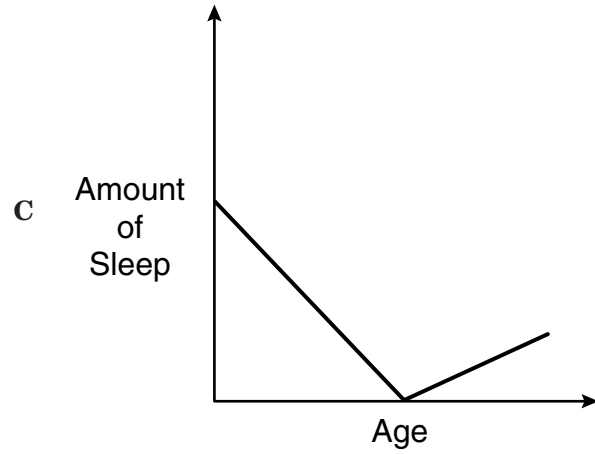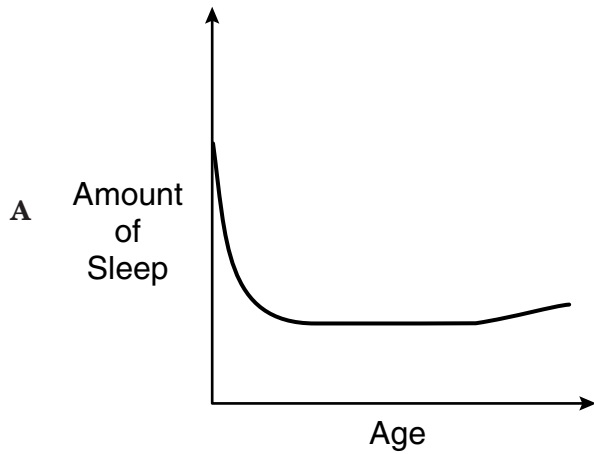
60 The energy output from a chemical reaction is dependent on the amount of chemicals used. The table shows this relationship.

Amount of Chemicals (moles)	Energy Output (joules)
5	20
8	32
12	48
15	60

What is a reasonable amount of energy output from the reaction of 32 moles of the chemicals?

F 77 joules

G 92 joules

H 110 joules

J 128 joules

BE SURE YOU HAVE RECORDED ALL OF YOUR ANSWERS ON THE ANSWER DOCUMENT.

STOP